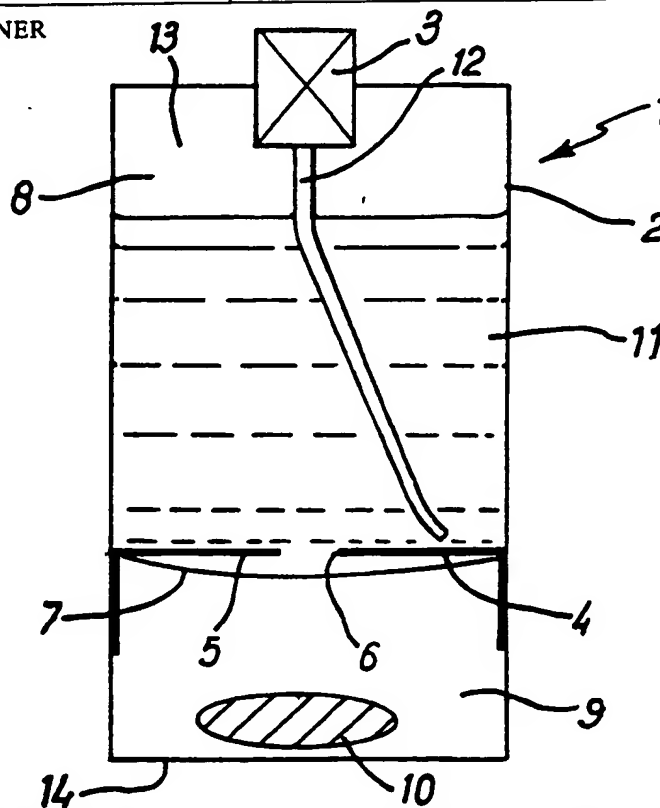


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(54) Title: A PRESSURISED CONTAINER



(57) Abstract

A pressurised container (1) for dispensing a fluid (11) is described. The container (1) includes a barrier (4) which is permeable to gas but is impermeable to liquids and solids. The barrier (4) divides the container into a first chamber (8) for containing the fluid (11) to be dispensed, and a second chamber (9) for containing a propellant (10). As fluid (11) is dispensed from the first chamber (8) gas from the propellant (10) in the second chamber (9), passes through the barrier (4) to equalise the pressures in the first and second chambers.

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1 "A Pressurised Container"

2

3 The invention relates to a pressure pack dispenser, and
4 in particular, a pressurised container for the
5 dispensing of fluids.

6

7 Conventional "airspray" type pressurised containers for
8 dispensing fluids use a low boiling point propellant
9 mixed with the product formulation. As the product is
10 dispensed from the container the low boiling point
11 propellant is discharged simultaneously and on leaving
12 the container the propellant evaporates to produce a
13 very fine spray of propellant, typically of the order
14 of 15 μm .

15

16 However, one disadvantage with this type of
17 conventional aerosol container is that the low boiling
18 point propellant is generally flammable and typically
19 comprises butane or propane. Hence, the spray from the
20 aerosol is flammable. Other conventional aerosol
21 containers use a CFC as a propellant which has the
22 disadvantage of being detrimental to the environment
23 and in both types of aerosol there is the danger of
24 solvent abuse. Furthermore, the low boiling point
25 propellant is mixed with the product formulation
26 throughout the shelf-life of the pressurised container.

1 In accordance with one aspect of the present invention,
2 a pressurised container for dispensing a fluid
3 comprises a container, a barrier permeable to gas and
4 which is substantially impermeable to liquids and
5 solids, the barrier mounted within the container to
6 divide the container into a first chamber and a second
7 chamber, the first chamber communicating with an outlet
8 in the container through which a fluid in the first
9 chamber may be dispensed, a valve mechanism to regulate
10 dispensing of the fluid through the outlet, and an
11 outlet conduit coupled to the outlet and extending into
12 the first chamber, wherein gas in either the first or
13 the second chamber may pass through the barrier to
14 equalise the pressures in the first and second
15 chambers.

16
17 In accordance with a second aspect of the present
18 invention, a pressurised container comprises a barrier
19 permeable to gas and substantially impermeable to
20 liquids and solids, the barrier mounted within the
21 container and dividing the container into a first
22 chamber and a second chamber, a valve mechanism
23 isolating an outlet in the container from the first
24 chamber and movable between a closed position and an
25 open position, the first chamber containing a fluid
26 comprising a liquid saturated with a gas, and the
27 second chamber containing a propellant; wherein
28 movement of the valve mechanism to the open position
29 permits the liquid to be dispensed from the container
30 through the valve mechanism by the pressure of the
31 fluid in the first chamber and dispensing of the fluid
32 from the container decreases the pressure in the first
33 chamber and causes the passage of propellant gas from
34 the second chamber through the gas-permeable barrier to
35 the first chamber to equalise the pressures in the

1 first and second chambers.

2

3 Typically, in the second aspect of the invention, the
4 pressurised container also includes an outlet conduit
5 coupled to the valve mechanism and which extends into
6 the first chamber.

7

8 Preferably the barrier may have pores of approximately
9 two microns size and may comprise a gas permeable
10 material such as a fabric, such as REPEL (trade mark)
11 manufactured by Gelman Sciences.

12

13 Typically, the barrier may include a main body section
14 manufactured from a gas impermeable material, such as
15 plastic, with one or more apertures in the body section
16 and a gas permeable material covering the one or more
17 apertures in the body section. Typically, the gas
18 permeable material is fixed to the body section so that
19 the material seals around the apertures in the body
20 section. Typically, the material is fabric. In one
21 example a single aperture could be provided, typically
22 of a few millimetres diameter and preferably, greater
23 than 5 millimetres.

24

25 Alternatively, the barrier could be formed around an
26 outlet conduit extending into the first chamber, the
27 outlet conduit being impermeable to gas. In this
28 embodiment, the second chamber is formed between the
29 gas permeable barrier and the external surface of the
30 outlet conduit and the first chamber is the remainder
31 of the container. Typically, in this example, the gas
32 permeable barrier could be generally in the form of a
33 cylinder of gas permeable material which is sealed to
34 the outlet conduit at the end of the outlet conduit
35 remote from the outlet valve and the other end of the

1 cylinder of gas permeable material being attached onto
2 the upper section of the container or onto the outlet
3 valve.

4
5 This example of the invention is particularly
6 advantageous where the container has a one way sealing
7 gasket, at the top of the can adjacent the valve, which
8 permits substances to be inserted into the can through
9 the gasket but prevents the escape of pressure from the
10 container. In this case, the upper end of the gas
11 permeable material could be attached to the top of the
12 can so that the propellant may be inserted into the
13 second chamber between the gas permeable material and
14 the outlet conduit by inserting the propellant through
15 the gasket.

16
17 In accordance with a third aspect of the present
18 invention, a pressurised container for dispensing a
19 fluid comprises a container, a barrier substantially
20 impermeable to a pressurising propellant and a fluid
21 comprising a liquid saturated with a gas in the
22 container, the barrier mounted within the container to
23 divide the container into a first chamber and a second
24 chamber and having valve means for selectively allowing
25 passage of the propellant through the barrier, the
26 first chamber communicating with an outlet in the
27 container through which a fluid in the first chamber
28 may be dispensed, a valve mechanism to regulate
29 dispensing of the fluid through the outlet, and an
30 outlet conduit coupled to the outlet and extending into
31 the first chamber, wherein the pressure of a propellant
32 in the second chamber is transmitted to the fluid by
33 means of passage of propellant gas through the valve
34 means in response to a pressure drop in the first
35 chamber caused by opening of the valve mechanism to

1 permit the fluid to pass through the outlet conduit and
2 be dispensed through the outlet.

3
4 In accordance with a fourth aspect of the present
5 invention, a pressurised container comprises a barrier
6 substantially impermeable to a pressurising propellant
7 and a fluid comprising a liquid saturated with a gas in
8 the container, the barrier mounted within the container
9 and dividing the container into a first chamber and a
10 second chamber and having valve means for selectively
11 allowing passage of the propellant through the barrier;
12 a valve mechanism isolating an outlet in the container
13 from the first chamber and movable between a closed
14 position and an open position, the first chamber
15 containing a fluid comprising a liquid saturated with a
16 gas, and the second chamber containing a propellant;
17 wherein movement of the valve mechanism to the open
18 position permits the liquid to be dispensed from the
19 container through the valve mechanism by the pressure
20 of the fluid in the first chamber and dispensing of the
21 fluid from the container decreases the pressure in the
22 first chamber to actuate the valve means to permit
23 passage of propellant gas from the second chamber to
24 the first chamber.

25

26 Preferably the valve means for selectively allowing
27 passage of the propellant is actuatable on reduction of
28 the pressure of the fluid in the container. Said means
29 is preferably a valve mechanism, such as a "woodcroft"
30 type valve or "butterfly" type valve.

31

32 Typically, in the fourth aspect of the invention, the
33 pressurised container also includes an outlet conduit
34 coupled to the valve mechanism and which extends into
35 the first chamber.

1 Typically, the outlet conduit extends into the first
2 chamber so that the end of the outlet conduit remote
3 from the valve mechanism is adjacent to the bottom of
4 the first chamber in order to evacuate the first
5 chamber of as much product as possible.

6
7 Typically, the outlet conduit may have a straight or
8 helical and/or spiral configuration and in addition, or
9 alternatively, may have through apertures in its side
10 wall.

11
12 Preferably, the valve mechanism comprises means to
13 aerate the liquid as it passes through the valve
14 mechanism and this means could comprise at least one
15 vapour tap in the valve mechanism which permits gas not
16 in solution on the liquid to aerate the liquid as it
17 passes through the valve mechanism.

18
19 Preferably, the vapour tap in the valve mechanism may
20 have a diameter of, for example, 0.010 to 0.050 inches,
21 typically 0.015 to 0.030 inches.

22
23 Typically, the particle size of fluid dispersed through
24 the outlet may be, for example, 10 to 30 μm , and
25 preferably 15 to 20 μm .

26
27 Preferably, liquid may be dispersed through the outlet
28 at a rate of, for example, 0.1 to 0.5 grams per second,
29 and typically 0.2 to 0.3 grams per second.

30
31 Typically, the propellant could be any suitable
32 propellant. However, preferably, the propellant
33 comprises a pressurised gas, such as nitrogen or carbon
34 dioxide. Alternatively, or in addition, the propellant
35 could comprise a propellant system, such as described

1 in European Patent Application No 0,385,773.

2

3 Preferably, the gas which saturates the liquid is a
4 gas, such as carbon dioxide or nitrogen. However, any
5 other suitable gas could be used.

6

7 Preferably, the initial pressure within the pressurised
8 container is at least substantially 100 psi and
9 typically, may be substantially 130 psi or greater.

10

11 Preferably, the volume ratio of the first chamber to
12 the second chamber is substantially 60:40.

13

14 Preferably, the gas not in solution in the liquid may
15 occupy a volume of approximately 10% of the first
16 chamber.

17

18 Preferably, the volume of gas not in solution in the
19 first chamber, exerts a pressure equal to that of the
20 propellant gas in the propellant chamber.

21

22 The apparatus may further have means to retain the
23 barrier in a fixed position during and after
24 pressurisation of the propellant. Typically, the means
25 to retain the barrier in position may comprise flanges
26 on an edge of the barrier which engage with a side wall
27 of the container.

28

29 Alternatively, or in addition to flanges on the edge of
30 the barrier, one or more lugs may be provided on the
31 inside wall of the container to engage with and retain
32 the barrier in position within the container.

33

34 Alternatively, the container may comprise a barrier as
35 a fixture of the container, such that it is permanently

1 retained in position during pressurisation of the
2 container.

3
4 Preferably, the pressure operable valve mechanism in
5 the barrier comprises a valve member which seals an
6 aperture in the barrier and the valve mechanism opens
7 when the pressure on the one side of the barrier
8 exceeds the pressure on the other side.

9
10 The valve mechanism may comprise a movable portion of
11 the barrier which typically may be provided by making a
12 portion of the material of the barrier flexible.

13
14 Typically, the movable portion is movable between a
15 first position in which the valve mechanism is closed a
16 second position in which the valve mechanism is open.
17 Typically, the valve mechanism may be opened by rupture
18 of the movable portion moves to the second position.
19 Alternatively, the valve mechanism could further
20 include a valve member which seals with the movable
21 portion when the movable portion is in the first
22 position to prevent propellant passing through the
23 valve mechanism but which does not seal with the
24 movable portion when the movable portion moves to the
25 second position, in order to permit propellant to pass
26 through the valve mechanism.

27
28 Embodiments of the invention will now be described by
29 way of example with reference to the accompanying
30 drawings in which:-

31 Fig. 1 is a cross-sectional view through a first
32 example of a pressurised dispenser;

33 Fig. 2 is a cross-sectional view through a second
34 example of a pressurised dispenser;

35 Fig. 3 is a cross-sectional view through a third

1 example of a pressurised dispenser;
2 Fig. 4 is a cross-sectional view through a fourth
3 example of pressurised container; and
4 Fig. 5 is a cross-sectional view through a fifth
5 example of pressurised container.

6
7 Fig. 1 shows a pressurised dispenser 1 which comprises
8 a can 2 with an outlet valve 3 fixed in an opening in
9 the top of the can 2. Mounted inside the can 2 is a
10 piston 4 which is typically fixedly mounted within the
11 can 2 in order to prevent movement of the piston 4
12 inside the can 2. For example, the piston 4 could be
13 fixedly mounted in the can 2 by bonding the piston to
14 the side walls of the can for example with adhesive, or
15 by engagement of the piston 4 with internal lugs in the
16 can which prevent movement of the piston 4. The piston
17 4 has a central section 5 which has an aperture 6
18 therein. Typically, the aperture 6 is of the order of
19 a few millimetres in diameter and in one example may be
20 6 to 8 millimetres in diameter. Sealed onto the
21 surface of the central section 5 is a gas permeable
22 membrane 7. In the example shown, the gas permeable
23 membrane is a material with a two micron pore size
24 which may be similar to that manufactured by Gelman
25 Sciences and described as a micro porous membrane.

26
27 The piston 4 divides the inside of the can 2 into a
28 product chamber 8 and a propellant chamber 9. The
29 propellant chamber 9 contains a propellant system, such
30 as described in European Patent Application No
31 0,385,773 which may use a propellant gas, such as
32 carbon dioxide in combination with a solvent such as
33 acetone and a polymer into which the acetone is sorbed.
34 In Fig. 1 the propellant system is denoted generally by
35 the reference numeral 10. The product chamber 8

1 contains a liquid product 11 to be dispensed from the
2 dispenser 1 through the outlet valve 3 via a dip tube
3 12. The product 11 is saturated with a gas such as
4 carbon dioxide and the carbon dioxide not absorbed into
5 the liquid 11 fills a head space 13 above the liquid
6 11. The outlet valve 3 may have one or more vapour
7 tapes (not shown) which consist of a small aperture
8 which extends from the outside surface of the valve 3
9 into an interior passage (not shown) of the valve 3
10 through which liquid 11 is dispensed. Hence, the one
11 or more vapour taps permit the gas in the head space 13
12 to communicate with the internal passage of the valve 3
13 through which the liquid 11 is dispensed.

14
15 In order to fill the dispenser 1 the bottom 14 of the
16 can maybe initially removed and the piston 4 inserted
17 into the can 2 through the open bottom section and then
18 the propellant system 10 inserted into the can 2 after
19 the piston 4. The bottom portion 14 of the can is then
20 sealed to the rest of the can 2. The liquid product
21 11, supersaturated with carbon dioxide gas may be
22 introduced into the can, for example by back filling
23 through the valve 3 and dip tube 12 until the required
24 volume of liquid 11 is within the can 2. Typically,
25 the volumes are chosen such that the head space 13
26 occupies a volume of approximately 10% of the volume of
27 the can 2. After the dispenser 1 has been filled the
28 pressure in the product chamber 8 and the propellant
29 chamber 9 equalise as carbon dioxide gas is free to
30 pass through the gas permeable membrane 7 between the
31 two chambers, via the aperture 6. However, the gas
32 permeable membrane 7 prevents the liquid 11 entering
33 the propellant chamber 9, and also prevents a
34 propellant system 10, other than the propellant gas
35 entering the product chamber 8.

1 Typically, the starting pressure with a full can may be
2 in the region of 100 psi to 150 psi. When the outlet
3 valve 3 is opened, the pressure in the product chamber
4 8 causes the liquid product 11 to be dispensed through
5 the valve 3 via the dip tube 12. The one or more
6 vapour taps permit gas in the headspace 13 to aerate
7 the liquid 11 as it passes through the valve 3 in order
8 to help create a fine spray of the product 11 as the
9 product 11 exits the valve 3. If a fine spray is not
10 required then the one or more vapour taps could be
11 omitted.

12
13 When a portion of the liquid 11 has been dispensed from
14 the product chamber 8 the pressure within the chamber
15 will have decreased. Hence, a pressure differential
16 will exist between the propellant chamber 9 and the
17 product chamber 8 which will cause carbon dioxide gas
18 to flow from the propellant chamber 9 through the gas
19 permeable membrane 7 and the aperture 6 into the
20 product chamber 8 to equalise the pressure between the
21 chambers. As the pressure in the propellant chamber 9
22 falls due to passage of the propellant gas into the
23 product chamber 8, the propellant system 10 will
24 release propellant gas into the propellant chamber 9
25 and the operation of the propellant system is described
26 in more detail in European Patent Application No
27 0,385,773 A.

28
29 Hence, the invention has the advantage of permitting
30 the gas in the headspace 13 to be replenished by making
31 use of a gas permeable barrier to separate the
32 propellant chamber from the product chamber. This has
33 the advantage of also isolating the product 11 from the
34 propellant system 10 to prevent any contamination
35 occurring between the product 11 and the propellant

1 system 10. It also has the advantage that if the
2 pressure in the product chamber increases, for example
3 due to an increase in the temperature of the can 2, the
4 increase in pressure will cause carbon dioxide gas to
5 be reabsorbed into the propellant system 10 and excess
6 pressure in the product chamber 8 will be reduced by
7 carbon dioxide gas passing from the product chamber 8
8 into the propellant chamber 9 to be reabsorbed into the
9 propellant system 10.

10
11 Fig. 2 shows a second example of the invention in which
12 components identical to the components in Fig. 1 have
13 identical reference numerals. In Fig. 2 the principal
14 difference between this example and the dispenser shown
15 in Fig. 1, is that the dispenser 20 shown in Fig. 2 has
16 a barrier 23 separating product chamber 25 from
17 propellant chamber 24. This barrier is a piece of gas
18 permeable membrane which is physically attached to the
19 can by sealing the edges of the membrane between the
20 bottom edges of the walls of the can and the base 22 of
21 the can which is fixed into the bottom edges of the can
22 2.

23
24 However, the operation of the dispenser 20 and in
25 particular, of the gas permeable membrane 23 is
26 essentially identical to the operation described above
27 for the dispenser 1 in Fig. 1.

28
29 Fig. 3 shows a third example of the invention in the
30 form of a dispenser 30. In the dispenser 30 the can 2
31 is similar to the can 2 shown in Figs. 1 and 2 but the
32 top section of the can is shown in more detail.
33 Generally, most pressurised dispenser cans 2 have an
34 opening of approximately one inch diameter at the top
35 of the can into which a moulded valve mounting section

1 31 is attached by crimping the section 31 onto the can
2 2 at a joint 32. The valve mounting section 31 has a
3 central aperture into which an outlet valve 3 is
4 mounted and the mounting section 31 is crimped onto the
5 valve body by means of typically, eight spot crimps.
6 The valve 30 is sealed to the mounting section 31 by
7 means of a rubber gasket 33 which acts as a seal to
8 prevent pressure escaping from the can 2 at this
9 mounting point.

10

11 In the dispenser 30, the gas permeable membrane 34 is
12 generally cylindrical in shape and extends around the
13 dip tube 12. The membrane 34 is sealed to the outer
14 surface of the dip tube 12 at a point 35 and the upper
15 section of the membrane 34 is fixed to the can 2 by
16 trapping the upper edge of the membrane 34 in the joint
17 32 between the valve mounting section 31 and can 2. In
18 this manner, the fluid of the propellant system 10, in
19 the form of acetone saturated with carbon dioxide to
20 the desired pressure may be inserted into the
21 propellant chamber 9, defined by the membrane 34 and
22 dip tube 12, under pressure between the gasket 33 and
23 valve mounting section 31. The product 11, which could
24 be presaturated with carbon dioxide gas, may be
25 inserted into the product chamber 8 by backfilling the
26 product chamber 8 through the valve 3 and dip tube 12.
27 As an alternative to presaturating the product with
28 carbon dioxide gas, the product could be inserted into
29 the product chamber 8 and then carbon dioxide gas
30 forced into the product chamber 8 under the desired
31 pressure. This could occur simultaneously with the
32 insertion of the fluid component of the propellant
33 system 10 and this would have the advantage of helping
34 to balance the pressure on either side of the membrane
35 34. As with the first and second examples described

1 for Figs. 1 and 2, the gas permeable membrane 34
2 permits equalisation of gas pressurises between the
3 product chamber 8 and propellant chamber 9 while
4 preventing the liquid product 11 entering the
5 propellant chamber 9 and similarly preventing the
6 liquid and solid elements of the propelling system 10
7 entering the product chamber 8. In the example shown
8 in Fig. 3 the polymer which forms part of the
9 propellant system is shown in granular form and
10 occupies part of the volume between the membrane 34 and
11 dip tube 12.

12
13 However, as an alternative to this the polymer for the
14 propellant system 10 could be in the form of a suitable
15 coating on the external surface of the dip tube 12 or
16 alternatively, could take the form of a coating on the
17 propellant chamber surface of the membrane 34.

18
19 As an alternative to fixing the top edge of the
20 membrane 34 to the can at the join 32 the membrane
21 could be sealed to the mounting section 31 in the
22 vicinity of the spot crimps which attach valve body 36
23 to the mounting section 31. In this example the
24 acetone with dissolved carbon dioxide gas could be
25 inserted into the propellant chamber 9 through the gaps
26 formed between the spot crimps which attach the valve
27 body 36 to the mounting section 31.

28
29 Fig. 4 shows a pressurised container 51 which includes
30 a barrier 52 mounted within the container 51 and is
31 used to separate and isolate a propellant 53 from a
32 liquid 54 in the container 51. The barrier 52 also
33 divides the container 51 into a product chamber 55 and
34 a propellant chamber 56.

35

1 The barrier 52 includes a pressure operable valve
2 mechanism 57 which is formed from the same material as
3 the rest of the barrier 52, for example, a plastics
4 material such as polyethylene. In addition, flanges 58
5 are formed on the outside surface 59 of the barrier 52
6 and these flanges sealingly engage with the internal
7 wall of the container 51 and retain the barrier 52 in
8 the position shown in Fig. 4.

9
10 The container 51 also includes a valve 60 which
11 isolates an outlet 61 from a dip tube 62 which extends
12 from the valve 60 to the barrier 52. The valve 60
13 includes at least one vapour tap (not shown) which
14 consists of a small aperture which extends from the
15 outside surface 63 of the valve 60 into an interior
16 passage (not shown) of the valve 60 through which a
17 liquid 54 in the product chamber 55 is dispensed to the
18 outlet 61. The dip tube 62 is typically manufactured
19 from a flexible plastics material, such as
20 polyethylene, or any other suitable flexible plastic
21 which does not chemically react with the contents of
22 the product chamber 55.

23
24 The liquid 54 in the product chamber 55 comprises a
25 liquid saturated with a gas and excess gas in the
26 product chamber 55 forms a headspace between an upper
27 wall 65 of the container 51 and the surface 16 of the
28 fluid 54. Typically, the gas 64 is nitrogen or carbon
29 dioxide.

30
31 Located in the propellant chamber 56 is a suitable
32 propellant, which could be pressurised gas such as
33 nitrogen or carbon dioxide or could be a propellant
34 system, such as that disclosed in European Patent
35 Application No 0,385,773.

1 In order to fill the container 51 the following
2 procedure may be adopted. Initially a predetermined
3 amount of propellant 53 is introduced into the
4 container and the barrier 52 is then inserted in the
5 container 51 and pushed along the container to the
6 position shown in Fig. 4. As the flanges 58 seal with
7 the internal walls of the container 51, the propellant
8 53 is prevented from escaping past the barrier 52 and
9 the propellant becomes pressurised due to the reduction
10 in volume.

11
12 The container is then filled with liquid 54, pre-
13 saturated with gas 64, which liquid sits on top of the
14 barrier 52 and is isolated from the propellant 53 by
15 the barrier 52. The liquid 54 and gas 64 may be
16 inserted into the container 54, for example by back-
17 filling the product chamber 55, by pumping the liquid
18 54, pre-saturated with gas 64, at a pre-determined
19 pressure through the valve mechanism 60 and the dip-
20 tube 62. In the particular example described here, the
21 amount of propellant is chosen so that when
22 approximately 60% of the interior volume of the
23 container 51 is occupied by product, the pressure of
24 the propellant 53 inside the propellant chamber 56 is
25 approximately 130 psi.

26
27 The liquid 54 is saturated with gas at a pressure
28 similar to the pressure of the propellant 53 so that
29 when the valve mechanism 60 is in the closed position,
30 the pressure of the liquid 54 and the propellant 53 are
31 approximately similar. Hence, because of the
32 similarity in pressure between the liquid 54 and the
33 propellant 53, the pressure operable valve mechanism 57
34 of the barrier 52 stays in its sealed position.
35

1 When the valve 60 is opened the internal pressure in
2 the container 51 forces liquid 54 through the dip tube
3 62, through the valve 60 and out of the container 51
4 through the outlet 61. The vapour taps permit some of
5 the gas 64 in the headspace to enter into the internal
6 passage of the valve mechanism 60. As the liquid 54
7 passes through the valve 60, the liquid 54 is aerated
8 by the gas 54 so that when the liquid/gas combination
9 is expelled through the outlet 61 a fine spray is
10 produced. Using this principal it may be possible to
11 obtain particle sizes for the spray down to 20 um or
12 smaller.

13
14 After some of the liquid 54 and the gas 64 has been
15 dispensed from the container 51 the pressure within the
16 container 51 will drop. Hence, more gas 64 will come
17 out of solution from the liquid 54 due to the drop in
18 pressure and replenish the gas lost through the vapour
19 taps.

20
21 As will be apparent from the above description, as more
22 liquid 54 and gas 64 is dispensed through the outlet 61
23 the more the pressure inside the container 51 will
24 decrease. This decrease in pressure opens the valve 57
25 and permits the propellant gas 53 to flow upwards
26 through the valve mechanism 57 in order to equalise the
27 pressures between the product chamber 55 and the
28 propellant chamber 56.

29
30 The vapour taps are designed so that the dimensions are
31 such that the gas 64 produced from the liquid 54 as the
32 pressure drops will not be exhausted through the vapour
33 taps faster than the usage of the container 51 would
34 allow the gas to reform. Hence, this would ensure that
35 sufficient headspace is maintained to allow the vapour

1 taps to work until the liquid 54 in the product chamber
2 55 has been exhausted.

3
4 When the valve mechanism 60 is opened, the flanges 58
5 which engage with the side wall of the container 51
6 retain the barrier 52 in the position shown in Fig. 4
7 against the action of the pressure differential between
8 the propellant 53 and the liquid 54.

9
10 In addition, lugs could be provided on the inside of
11 the container 57 to facilitate retention of the barrier
12 52 within the container 51 in the position shown in
13 Fig. 4.

14
15 Fig. 5 shows a second example of a pressurised
16 container 70, which includes a barrier 71 as a fixture
17 mounted within the container 70. The barrier 71 is
18 used to separate and isolate a propellant 72 from a
19 liquid 73 in the container 70 and to divide the
20 container into product chamber 74 and a propellant
21 chamber 75. The barrier 71 includes a pressure
22 operable valve mechanism 76 and is manufactured from a
23 plastics material such as polyethylene. The barrier is
24 pre-fitted inside the container 70 to a pre-determined
25 spacing from the base 77 of the container 70.

26
27 The container 70 also includes a valve 78 which
28 isolates an outlet 79 from a dip tube 80 which extends
29 from the valve 78 to the barrier 71. The valve 78
30 includes at least one vapour tap (not shown) which
31 consists of a small aperture which extends from the
32 outside surface 81 of the valve 78 into an interior
33 passage (not shown) of the valve 78 through which a
34 liquid in the product chamber 74 is dispensed to the
35 outlet 79.

1 The fluid 73 comprises a liquid saturated with a gas
2 and excess gas 82 forms a headspace between an upper
3 wall 83 of the container 70 and the surface 84 of the
4 liquid 73. Typically, the gas 82 is nitrogen or carbon
5 dioxide.

6

7 The container 70 also comprises a plug 85 which seals
8 an aperture 86 in the bottom surface 77 of the
9 propellant chamber 75.

10

11 In use, liquid 73 pre-saturated with gas 82 is
12 introduced into the product chamber 74, for example, by
13 back-filling the product chamber 74 by pumping the
14 liquid 78 pre-saturated with gas 82 at a predetermined
15 pressure through the valve mechanism 78 and the dip
16 tube 80.

17

18 Propellant 72 is introduced into the propellant chamber
19 75 through the aperture 85 and the aperture is then
20 sealed with a plug 85. The amount of propellant 72
21 required is pre-determined so that the pressure of the
22 propellant 72 substantially equals the pressure of the
23 excess gas 82. Typically, the propellant 72 is
24 introduced into the chamber 75 by adding a pre-
25 determined amount of propellant 72 in a substantially
26 non-gaseous form, for example a propellant gas 72 which
27 has been cryogenically cooled to a temperature at which
28 the propellant gas is liquefied or solidified. Hence,
29 the chamber 75 is loaded with the propellant gas 72 at
30 ambient atmospheric pressure, with the subsequent
31 thawing giving rise to the essential gaseous pressure
32 of the propellant.

33

34 Operation of the container 70 is similar to the
35 operation of container 51 as described in above and

1 shown in Fig. 4.

2

3 Improvements and modifications may be incorporated
4 without departing from the scope of the invention.

5

1 CLAIMS

2
3 1 A pressurised container for dispensing a fluid
4 comprising a container, a barrier permeable to gas
5 and which is substantially impermeable to liquids
6 and solids, the barrier mounted within the
7 container to divide the container into a first
8 chamber and a second chamber, the first chamber
9 communicating with an outlet in the container
10 through which a fluid in the first chamber may be
11 dispensed, a valve mechanism to regulate dispensing
12 of the fluid through the outlet, and an outlet
13 conduit coupled to the outlet and extending into
14 the first chamber, wherein gas in either the first
15 or the second chamber may pass through the barrier
16 to equalise the pressures in the first and second
17 chambers.

18
19 2 A pressurised container comprising a barrier
20 permeable to gas and substantially impermeable to
21 liquids and solids, the barrier mounted within the
22 container and dividing the container into a first
23 chamber and a second chamber, a valve mechanism
24 isolating an outlet in the container from the first
25 chamber and movable between a closed position and
26 an open position, the first chamber containing a
27 fluid comprising a liquid saturated with a gas, and
28 the second chamber containing a propellant; wherein
29 movement of the valve mechanism to the open
30 position permits the liquid to be dispensed from
31 the container through the valve mechanism by the
32 pressure of the fluid in the first chamber and
33 dispensing of the fluid from the container
34 decreases the pressure in the first chamber and
35 causes the passage of propellant gas from the

1 second chamber through the gas-permeable barrier to
2 the first chamber to equalise the pressures in the
3 first and second chambers.

4
5 3 A pressurised container according to Claim 2, and
6 further comprising an outlet conduit coupled to the
7 valve mechanism and which extends into the first
8 chamber.

9
10 4 A pressurised container according to any of the
11 preceding Claims, wherein the barrier comprises a
12 micro-porous membrane.

13
14 5 A pressurised container according to any of the
15 preceding Claims, wherein the barrier comprises a
16 body member manufactured from a gas impermeable
17 material and having an aperture therein, and a gas
18 permeable material covering the aperture.

19
20 6 A pressurised container according to Claim 1 or
21 Claim 3 or Claim 4, wherein the barrier is formed
22 around the outlet conduit, the second chamber being
23 defined by at least a portion of the outer surface
24 of the outlet conduit and the barrier.

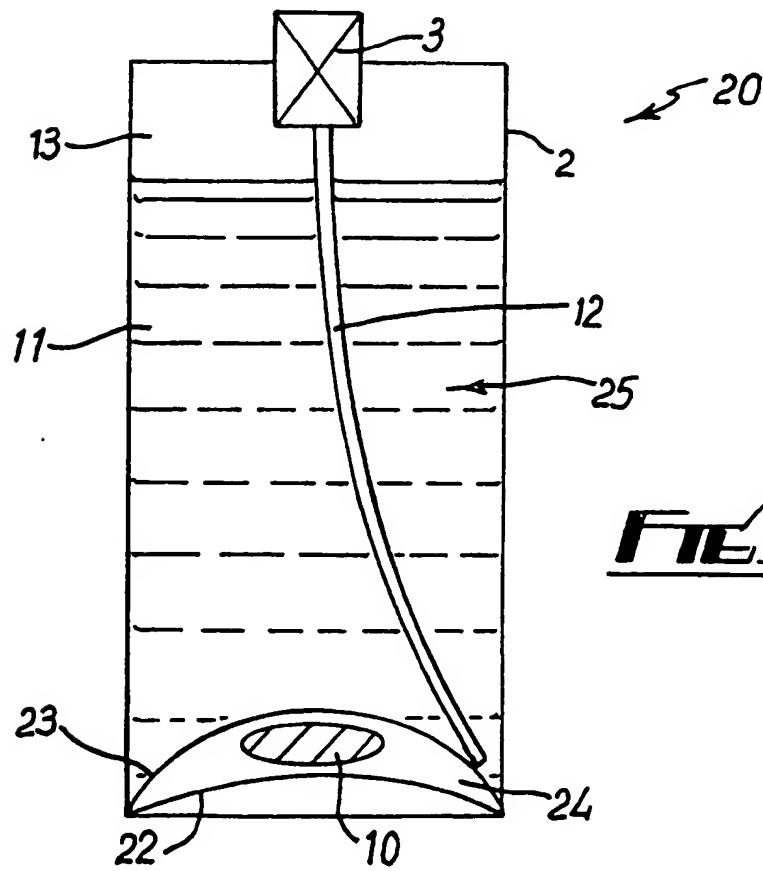
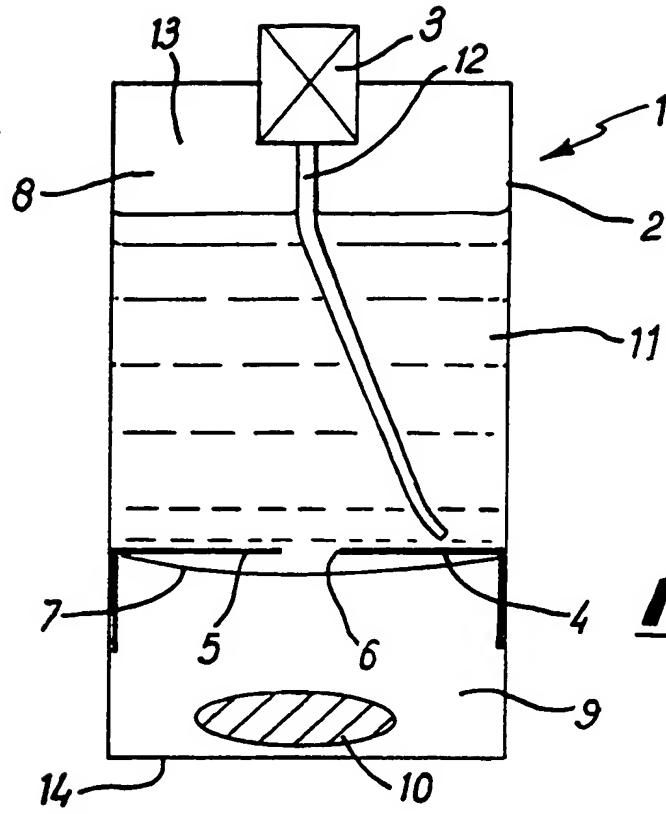
25
26 7 A pressurised container according to Claim 6,
27 wherein the second chamber is an annular chamber
28 extending around outside surface of the outlet
29 conduit.

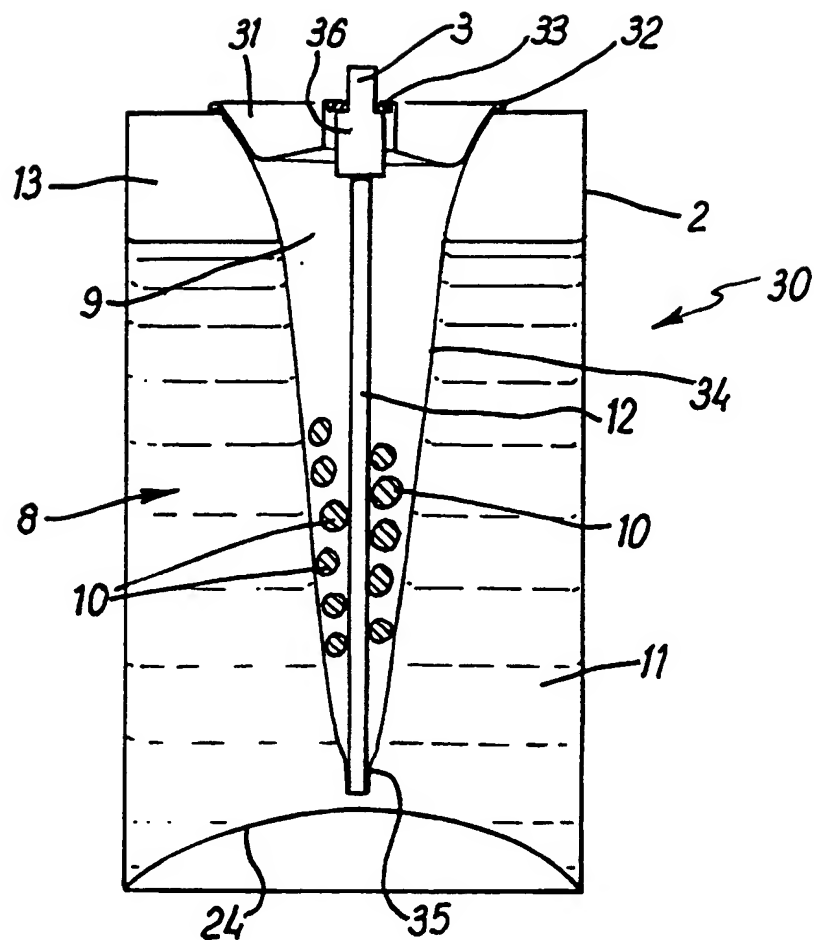
30
31 8 A pressurised container accordingly to Claim 6 or
32 Claim 7, wherein the barrier is sealed to the
33 outlet conduit and to the container adjacent the
34 valve mechanism.

35

- 1 9 A pressurised container according to any of Claims
2 6 to 8, wherein the propellant comprises a fluid
3 component which is introduced into the second
4 chamber by introducing the fluid component through
5 a sealing member which seals the valve mechanism to
6 the container.
7
- 8 10 A pressurised container according to any of the
9 preceding Claims, wherein the valve mechanism
10 comprises aerating means to aerate the liquid as it
11 is dispensed through the valve mechanism.
12
- 13 11 A pressurised container for dispensing a fluid
14 comprising a container, a barrier substantially
15 impermeable to a pressurising propellant and a
16 fluid comprising a liquid saturated with a gas in
17 the container, the barrier mounted within the
18 container to divide the container into a first
19 chamber and a second chamber and having valve means
20 for selectively allowing passage of the propellant
21 through the barrier, the first chamber
22 communicating with an outlet in the container
23 through which a fluid in the first chamber may be
24 dispensed, a valve mechanism to regulate dispensing
25 of the fluid through the outlet, and an outlet
26 conduit coupled to the outlet and extending into
27 the first chamber, wherein the pressure of a
28 propellant in the second chamber is transmitted to
29 the fluid by means of passage of propellant gas
30 through the valve means in response to a pressure
31 drop in the first chamber caused by opening of the
32 valve mechanism to permit the fluid to pass through
33 the outlet conduit and be dispensed through the
34 outlet.
35 12 A pressurised container comprising a barrier

1 substantially impermeable to a pressurising
2 propellant and a fluid comprising a liquid
3 saturated with a gas in the container, the barrier
4 mounted within the container and dividing the
5 container into a first chamber and a second chamber
6 and having valve means for selectively allowing
7 passage of the propellant through the barrier; a
8 valve mechanism isolating an outlet in the
9 container from the first chamber and movable
10 between a closed position and an open position, the
11 first chamber containing a fluid comprising a
12 liquid saturated with a gas, and the second chamber
13 containing a propellant; wherein movement of the
14 valve mechanism to the open position permits the
15 liquid to be dispensed from the container through
16 the valve mechanism by the pressure of the fluid in
17 the first chamber and dispensing of the fluid from
18 the container decreases the pressure in the first
19 chamber to actuate the valve means to permit
20 passage of propellant gas from the second chamber
21 to the first chamber.





FTE.3

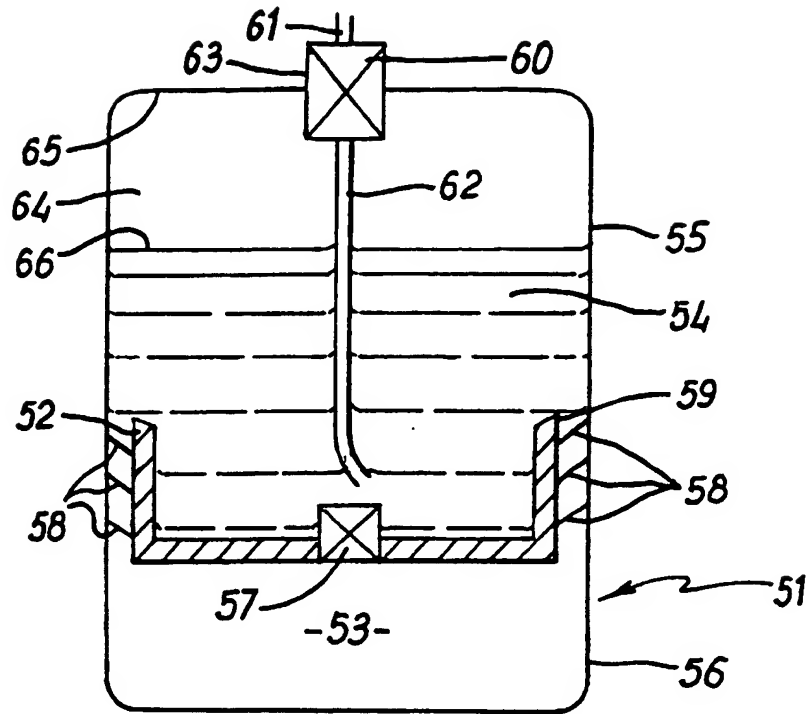


FIG. 4

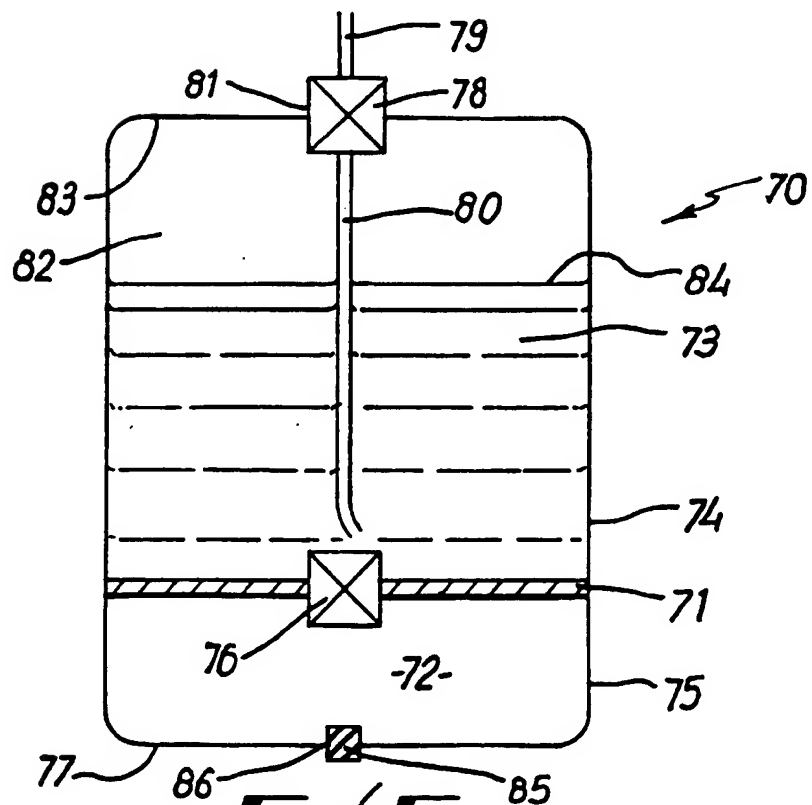


FIG. 5

I. CLASSIFICATION OF SUBJECT MATTER. (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 B65D83/14		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	B65D ; F17C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ^o	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US,A,3 970 219 (SPITZER ET AL.) 20 July 1976 see the whole document ---	1-7, 11, 12
A	DE,A,2 929 348 (THE CONTINENTAL GROUP) 21 February 1980 see the whole document ---	1, 2, 11, 12
A	DE,A,2 826 633 (FREUND INDUSTRIAL CO., LTD.) 3 January 1980 see the whole document -----	1, 2, 11, 12
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>^o Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 09 MARCH 1993		Date of Mailing of this International Search Report 25. 03. 93
International Searching Authority EUROPEAN PATENT OFFICE		Signature of Authorized Officer ELMEROS C.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9202112
SA 67607

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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DE-A-2929348	21-02-80	None	
DE-A-2826633	03-01-80	None	